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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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10/591,991

09/07/2006

Yasushi Noguchi

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EXAMINER

KEMMERLE III, RUSSELL J

ART UNIT

PAPER NUMBER

1791

NOTIFICATION DATE

DELIVERY MODE

11/16/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| | | | |
|------------------------------|--------------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/591,991 | Applicant(s) NOGUCHI ET AL. | |
| | Examiner RUSSELL J. KEMMERLE III | Art Unit 1791 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/23/09; 8/18/09</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The finality of the Office action mailed 18 August 2009 is hereby withdrawn in view of the new ground of rejection set forth below.

Claim Rejections - 35 USC § 103

Claims 1-3, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumazawa (US Published Application 2002/0,180,119) in view of Noguchi (US published Application 2003/0,041,574).

Kumazawa discloses a method of making a ceramic honeycomb where a mixture of cordierite forming raw materials are mixed with a forming agent (pore former) and water (a dispersion medium). This mixture is then extruded to form a green ceramic honeycomb structure, which is dried and fired (page 2 paragraph 13).

Kumazawa discloses that the raw materials are subjected to spray drying before mixing (page 2, paragraph 13). One of ordinary skill in the art would understand that due to the nature of spray drying, the result is a particle that is almost perfectly spherical (circularity close to 1).

Kumazawa does not disclose that the pore forming agent be hollow particles.

Noguchi discloses a method of making a ceramic honeycomb structure substantially similar to the process of Kumazawa (abstract). Noguchi discloses the use of expanded foam resins (such as acrylic microcapsules) as the pore forming agent, which are hollow and provide high porosity while restraining heat liberation during firing. Noguchi further discloses that the raw materials be mixed and kneaded in a vacuum tug mill before extrusion (page 5 paragraph 82).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method Kumazawa by using the hollow microcapsule pore formed of Noguchi. This would have been obvious because Noguchi discloses that the use of such pore formers results in high porosity while restraining heat liberation during firing, which can lead cracks and other defects in the finished product.

It would have been further obvious to use the vacuum tug mill of Noguchi in order to ensure there are no undesired gas inclusions in the material as it is being extruded. While Noguchi does not disclose the pressure inside the tug mill during the mixing and kneading, it would clearly be below standard atmospheric pressure. Further, it would have been within the abilities of one of ordinary skill in the art to optimize the pressure of the vacuum to within about 8325-101325 Pa (the approximate absolute pressure recited in claim 1 based on Applicants description of the meaning of the negative pressure as being that amount below standard atmospheric pressure, and 1 atmosphere being 101325 Pa). It is will understood by those skilled in the art that a reduced pressure during milling will remove gas from a clay mixture, which will in turn prevent gas inclusions in the molded body which would lead to impurities in the finished product. The currently recited reduced mixing pressure does not appear to achieve anything beyond this expected and predictable result.

"[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In *Re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which

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was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

Referring to claim 6, Kumazawa discloses that the cordierite forming raw materials may include talc, kaolin, calcined kaolin, alumina, aluminum hydroxide, and silica (page 2 paragraph 13). Since they are all spray dried prior to mixing, they would all contain mostly spherical particles.

Referring to claim 8, Kumazawa discloses that the particles used by 45 μm or less (page 2, paragraph 13).

Claims 1-4, 6, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumazawa in view of Noguchi and Suzuki (US Patent 5,087,278).

Kumazawa and Noguchi are relied upon as discussed above, but do not disclose the level of circularity of the ceramic particles, or that the spheres are formed by heating the particles to between the materials melting temperature and 300°C above the melting temperature. Specifically, they do not disclose that silica spheres are formed by heating to 1730-2030°C.

Suzuki discloses a method of forming a porous ceramic article. Suzuki specifically discloses that it is preferable that the ceramic powders be spherical so as to minimize the number of contact points between particles to more easily produce a

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porous body (Col 3 lines 46-49). Suzuki further discloses that the particles should be as close to a perfect sphere as possible (circularity close to 1) (Col 3 lines 53-56).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method of Kumazawa in view of Noguchi by using spherical particles as taught by Suzuki. This would have been obvious because Suzuki discloses that spherical particles more easily create a porous body with higher strength than a body made with particles of other shapes.

Referring specifically to claims 4 and 7, Suzuki discloses making silica spheres by contacting silica particles with a flame at a temperature of around 2,000-2,200°C (Col 8 lines 22-29).

Suzuki further discloses that melt-sphered silica powder having an average diameter of up to 5 μm is effective for such applications (Cols 15-18, Table 2).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kumazawa in view of Noguchi and Suzuki in further view of Guerfi (US Published Application 2004/0,053,050).

Kumazawa, Noguchi and Suzuki are relied upon as discussed above, but do not disclose that the spherical particles are obtained by crushing the particles with a jet air current.

Guerfi discloses a known method of forming a spherical particle out of an irregularly shaped particle that involves jet air grinding (page 5 paragraph 80).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method of Kumazawa, Noguchi and Suzuki

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as discussed above by using jet air grinding to obtain spherical particles as taught by Guerfi. This would have been obvious because both the melt-sphereing of Suzuki and the jet air grinding of Guerfi are both method of forming a spherical particle out of an irregularly shaped one, and one of ordinary skill in the art would expect them to operate in similar manners to obtain a similar result.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RUSSELL J. KEMMERLE III whose telephone number is (571)272-6509. The examiner can normally be reached on Monday through Thursday, 7:00-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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